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## PART I - ADMINISTRATIVE

### Section 1. General administrative information

Title of project

Annual Stock Assessment - Cwt (Usfws)

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BPA project number: 8906500

Contract renewal date (mm/yyyy): 1/2000

☐ Multiple actions?

Business name of agency, institution or organization requesting funding

U.S. Fish and Wildlife Service

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Business acronym (if appropriate)

USFWS

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Proposal contact person or principal investigator:

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NPPC Program Measure Number(s) which this project addresses

3.3B.1, 4.1, 5.0B, 7.2A.2, 7.2B.1, 7.2B.2, 7.2D.1, 7.2D.3, 7.2D.4, 7.4I, 7.4K, 8.4C1, 8.4C.2, 8.4D.1

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FWS/NMFS Biological Opinion Number(s) which this project addresses

Endangered Species Act Section 7 Biological Opinion (No.383).

Endangered Species Act Section 7 Biological Opinion on 1995 Fisheries in the Snake River Basin

Conducted Under the Columbia River Fish Management Plan, Consultation Number 428.

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Other planning document references

NMFS Proposed Recovery Plan for Snake River Salmon (2.1.d.5, 3.4.b)

Nez Perce Tribe Coho Restoration Program

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Short description

Apply coded-wire tags to production groups of salmon at federal hatcheries not tagged by other programs (4 hatcheries). Prepare report on survival trends and distribution of anadromous stocks from 11 federal hatcheries for basin-wide stock assessment.

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Target species

Spring chinook and coho salmon

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### Section 2. Sorting and evaluation

Subbasin

Systemwide

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### Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
<input checked="" type="checkbox"/> Anadromous fish <input type="checkbox"/> Resident fish <input type="checkbox"/> Wildlife	<input checked="" type="checkbox"/> Multi-year (milestone-based evaluation) <input type="checkbox"/> Watershed project evaluation	<input type="checkbox"/> Watershed councils/model watersheds <input type="checkbox"/> Information dissemination <input type="checkbox"/> Operation & maintenance <input type="checkbox"/> New construction <input checked="" type="checkbox"/> Research & monitoring <input type="checkbox"/> Implementation & management <input type="checkbox"/> Wildlife habitat acquisitions

## Section 3. Relationships to other Bonneville projects

***Umbrella / sub-proposal relationships.*** List umbrella project first.

Project #	Project title/description
20543	Coded Wire Tag Program
8201300	Coded Wire Tag Recovery Program (PSMFC)
8906500	Annual Stock Assessment - CWT (USFWS)
8906600	Annual Stock Assessment - CWT (WDFW)
8906900	Annual Stock Assessment - CWT (ODFW)

### ***Other dependent or critically-related projects***

Project #	Project title/description	Nature of relationship
9306000	Select Area Fisheries Evaluation	Source of fish, and reared, tagged and marked for program.
9603302	Yakima River Coho Restoration	Source of fish, and reared for this program.
9000500	Umatilla Hatchery Monitoring and Evaluation Projects	Source of fish, evaluated against this source program.
8343500	Umatilla Hatchery Satellite Facilities O&M	Source of fish, and reared for this program and evaluated against the source program.
9604000	Wenatchee/Methow Coho Restoration	Past and potential source of fish, and reared for this program and evaluated against the source program.
9600800	PATH- Participation by State & Tribal Agencies	CWT data from 8906500 used in analyses.
8712702	Comparative Survival Rate Study (CSS) of Hatchery PIT Tagged Chinook	Fish from 8906500 project hatchery used as control group in this study. CWT data needed for comparative survival analysis to PIT tags.

## Section 4. Objectives, tasks and schedules

### ***Past accomplishments***

Year	Accomplishment	Met biological objectives?
1989	Tagged and marked 334,236 salmon	Yes
1990	Tagged and marked 372,770 salmon	Yes
1991	Tagged and marked 882,816 salmon	Yes
1992	Tagged and marked 872,385 salmon	Yes

1993	Tagged and marked 1,094,511 salmon	Yes
1994	Tagged and marked 1,042,845 salmon	Yes
1995	Tagged and marked 1,076,237 salmon	Yes
1996	Tagged and marked 556,744 salmon	Yes
1997	Tagged and marked 718,358 salmon	Yes
1998	Tagged and marked 693,431 salmon	Yes

### ***Objectives and tasks***

<b>Obj 1,2,3</b>	<b>Objective</b>	<b>Task a,b,c</b>	<b>Task</b>
1	Coded-wire tag, mark, and release at least one group of smolts from those federal anadromous hatcheries not currently doing so.	a	Coordinate tagging with all appropriate entities.
		b	Apply coded-wire tags to and remove the adipose fins from 250,000 salmon at four hatcheries.
		c	Prepare annual budget and activity report.
2	Recover and decode coded-wire tags from returning salmon at four federal hatcheries. Estimate survival and distribution of tagged groups.	a	Examine 100% of returning salmon at four hatcheries. Collect scale sub-samples. Collect snouts from all fish with coded-wire tags.
		b	Recover and decode tags.
		c	Read scales.
		d	Prepare data for input to PSMFC database.
		e	Access PSMFC database for other recoveries of tagged groups. Estimate survival and distribution of tagged groups.
		f	Analyze and evaluate results.
3	Prepare annual written report which will evaluate the survival and distribution of all representative groups of production fish released at each of 11 federal anadromous hatcheries in the Columbia River Basin.	a	Retrieve coded-wire tag recoveries from PSMFC database for tagged production groups.
		b	Estimate survival and distribution of tagged groups. Evaluate results.
		c	Prepare annual analysis report.

### ***Objective schedules and costs***

<b>Obj #</b>	<b>Start date mm/yyyy</b>	<b>End date mm/yyyy</b>	<b>Measureable biological objective(s)</b>	<b>Milestone</b>	<b>FY2000 Cost %</b>
1	1/2000	12/2000	Tag and mark 250,000 salmon smolts.		64.00%
2	1/2000	12/2000	Recover tags and estimate survival and distribution of stocks from 4 federal hatcheries.		15.00%
3	1/2000	12/2000	Prepare annual written report on survival and distribution of stocks from 12 federal		21.00%

			hatcheries.		
				<b>Total</b>	100.00%

**Schedule constraints**

None

**Completion date**

Ongoing

## Section 5. Budget

**FY99 project budget (BPA obligated):** \$399,460

***FY2000 budget by line item***

Item	Note	% of total	FY2000
Personnel		%25	28,157
Fringe benefits		%9	9,855
Supplies, materials, non-expendable property		%17	18,625
Operations & maintenance		%16	17,857
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		%0	
NEPA costs		%0	
Construction-related support		%0	
PIT tags	# of tags:	%0	
Travel		%2	1,660
Indirect costs		%25	28,182
Subcontractor		%6	6,250
Other		%0	
<b>TOTAL BPA FY2000 BUDGET REQUEST</b>			<b>\$110,586</b>

***Cost sharing***

Organization	Item or service provided	% total project cost (incl. BPA)	Amount (\$)
		%0	
		%0	
		%0	
		%0	
<b>Total project cost (including BPA portion)</b>			<b>\$110,586</b>

***Outyear costs***

	FY2001	FY02	FY03	FY04
<b>Total budget</b>	\$121,645	\$133,810	\$147,191	\$161,910

## Section 6. References

Watershed?	Reference
<input type="checkbox"/>	Allard, D. 1995. Annual coded wire program - missing production groups. Annual report 1994. DOE/BP-01931-2, Bonneville Power Administration, Portland, Oregon.
<input type="checkbox"/>	Ambrogetti, W.J. 1976. Northwest fisheries program, micro-tagging trailer. USFWS Special Report.
<input type="checkbox"/>	DeLibro, F.E. 1986. A statistical assessment of the use of the coded wire tag for chinook ( <i>Oncorhynchus tshawytscha</i> ) and coho ( <i>O. kisutch</i> ). PhD. dissertation, University of Washington.
<input type="checkbox"/>	NMFS. 1995. Proposed recovery plan for Snake River salmon. National Marine Fisheries Service.
<input type="checkbox"/>	NPPC. 1994. 1994 Columbia River Basin fish and wildlife program. Northwest Power Planning Council
<input type="checkbox"/>	Pastor, S.M. 1998. Annual coded wire program - missing production groups. Annual report 1997. DOE/BP-01931-3, Bonneville Power Administration, Portland, Oregon.
<input type="checkbox"/>	Pastor, S.M. 1997. Annual coded wire program - missing production groups. Annual report 1996. DOE/BP-01931-3, Bonneville Power Administration, Portland, Oregon.
<input type="checkbox"/>	Pastor, S.M. 1996. Annual coded wire program - missing production groups. Annual report 1995. DOE/BP-01931-2, Bonneville Power Administration, Portland, Oregon.
<input type="checkbox"/>	PSMFC. 1987. Procedures for coded wire tagging Pacific salmonids. Regional Mark Processing Center, Pacific States Marine Fisheries Commission.
<input type="checkbox"/>	

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## PART II - NARRATIVE

### Section 7. Abstract

The goal of the “Annual Stock Assessment – Project 8906500 (ASA-8906500) coded-wire tag program is to tag a statistically valid number of coho and chinook salmon from each hatchery such that accurate estimates of survival and distribution in the ocean and in-river can be made. These data will allow for more accurate assessments of the proportion of wild and hatchery stocks in the Basin and further allow for valid statistical comparisons to be made among project groups. For among group comparisons, release numbers of coded-wire tagged fish have been calculated to have sufficient power such that the probability of detecting a 50% difference in survival among groups is  $p = 1 - 0.95/2$ . Survivals of fish released in this project can be used for comparison with coded-wire tag groups originating from other projects throughout the region.

The expected outcome of this project is to provide a long and consistent time series of survival and distribution data that can be used to measure trends in abundance of hatchery fish and be used as surrogate data for critical wild stocks. These outcomes are possible by tagging adequate numbers of fish and by providing 100% sampling rates at hatcheries.

The project is consistent with the 1994 Columbia River Basin Fish and Wildlife Program goals for monitoring and evaluation (Section 3), restoration of wild stocks (Sections 4 & 7), increased hatchery effectiveness (Section 7), and improved stock assessment and harvest management (Section 8). This project is expected to contribute to these goals by providing annual monitoring, as well as a long-term, consistent data base that contributes to modeling efforts such as used in the PATH project. These data will ultimately be used to address critical uncertainties identified in the 1994 Fish and Wildlife Program as well as for managing the Columbia River.

## **Section 8. Project description**

### **a. Technical and/or scientific background**

The coded-wire tag is a stock assessment tool that allows fishery managers to identify the origin of salmon and steelhead when these fish are captured or recovered in fisheries, on spawning grounds, at hatcheries, or in juvenile and adult migrant traps. The coded-wire tag is a relatively inexpensive tool that allows the fishery manager to gain more information about groups of fish over a broader geographic area than the more expensive PIT tag. For example, coded wire tag recoveries have identified the greater distance of ocean migration of mid and upper Columbia River chinook stocks relative to lower river chinook stocks. The coded-wire tag provides accurate estimates of survival, and when applied in sufficient numbers, coded-wire tags have been used to statistically measure differences in performance between experimental groups. Such uses include measuring performance of fish subjected to different hydroelectric passage regimes (barging v. direct release), differences in response to rearing and growth regimes in hatcheries, and basic survival differences between hatchery and wild produced smolts.

This project addresses many of the critical uncertainties associated with releases of hatchery reared fish. By providing a stable, representative and consistent data base, rates of production of upriver and lower river hatchery and wild fish can be determined and accounted for. Further, it meets objectives in the 1994 Columbia River Basin Fish and Wildlife Program (1994 Fish and Wildlife Program) (NPPC 1994) and in the Biological Opinion for Recovery of Snake River (and soon for Columbia River) for basic monitoring and evaluation.

Prior to this project, groups of coded-wire tagged fish were released from Columbia Basin hatcheries in an inconsistent and random pattern, with some hatcheries included for several years in succession and production from other hatcheries not tagged at all. This pattern of inconsistent tagging resulted in critical uncertainties in the proportion of fish from specific stock groups (wild and hatchery) in escapement and fisheries, where fish of Columbia River origin (both wild and hatchery) mingle with fish from other locations. It made determination of hatchery effectiveness very difficult because it assumed that production capabilities from each hatchery and stray rates were the same, which was found to be untrue based on other tagging exercises.

### **b. Rationale and significance to Regional Programs**

The rationale for this project is to provide comprehensive stock assessment and hatchery salmon production monitoring data to regional management entities and all other researchers. The data generated from the long-term coded-wire tag program will be useful, if not essential, in meeting many of the goals and objectives of the 1994 Fish and Wildlife Program. These include:

- 1) Monitoring and evaluation (Section 3)
- 2) Restoration of wild stocks (Sections 4 & 7)
- 3) Improved passage around dams (Sections 5 )
- 4) Increased hatchery effectiveness (Section 7)
- 5) Improved stock assessment and harvest management (Section 8)

Monitoring and evaluation is a central theme of the 1994 Fish and Wildlife Program. This is typified for all aspects of the 1994 Fish and Wildlife Program in Section 3 and specifically in Section 3.3B.1, which calls for an anadromous fish database that would "...ascertain the performance of Columbia River Basin hatcheries." This database is now known as StreamNet. Data from hatchery stocks tagged and evaluated under the ASA-8906500 are a part of this database.

Section 4.1 calls for the doubling of salmon and steelhead runs without the loss of biological diversity. Accurate and long-term data that goes to the evaluation of, and interaction with, wild and natural stocks are vital to this goal. Data from hatchery stocks tagged and evaluated under the ASA-8906500 are a part of these data.

The data generated by coded-wire tagged fish participating in the Mainstem Passage Experimental Program (5.0B) help to answer the uncertainties tested by each of the three hypotheses of this program. These data are also compared to data from hatchery populations below and above Bonneville Dam that are not undergoing the same treatment. These comparisons help to highlight other factors that might affect the outcome of the Mainstem Passage experiments. These comparisons can only be made if the hatchery populations are coded-wire tagged. One goal in section 5.0B is to understand the relative within-year differences in survival to adult return of fish that migrated in the river versus those that were transported. Similar goals are found in the Annual Coded-Wire Tag Program where comparisons are made between fish reared under differing environmental conditions (including transport and differing hatchery environments or locations and at different hatcheries).

Much of the critical uncertainty associated with the Mainstem Passage Experimental Program results from conflicting beliefs based on limited and inadequate information. For example, should draw down of reservoirs be used instead of barging juvenile salmon? The answer to this question requires data generated information. Coded-wire tags are the best tool currently available for providing this kind of data. Each hypothesis put forth under the Mainstem Passage Experimental Program will be tested, in part, by recovery of fish with coded-wire tags which will provide information that the other assessment tool, PIT tags, cannot provide.

In Section 7 of the Fish and Wildlife Program, direction is given to improve operations of artificial production facilities so that impacts of hatchery fish on wild fish and naturally spawning populations are minimized and the quality of hatchery fish are improved. The directive in this section of the Program means making investments and other adjustments to provide harvest opportunities in tributaries or other areas where hatchery fish congregate and to facilitate rebuilding of weak populations.

Data generated by the ASA-8906500 must be used in Sections 7.2A.1 and 7.2A.2, the monitoring and evaluation of hatchery and wild and naturally spawning stock interactions, and the impact analysis of hatcheries on wild and naturally spawning fish. The tagging of coho and chinook from lower river hatcheries allows us to assess whether these fish are straying into upriver spawning populations in the same way that the tagging of coho introduced into the Yakima River or chinook from the Umatilla River assesses the impacts and success of these programs. Having tagged fish of Idaho, Oregon and Washington origin helps fishery managers assess how and where these fish co-mingle, both in the ocean and during their upstream migration to the spawning grounds. Without these data, fishery managers cannot assess if one or more critical stocks are being over-harvested or whether there are windows available for harvest of hatchery fish when these critical stocks are at low numbers and not subject to harm from a fishery. Most importantly coded-wire tags allow managers to determine the status of critical stocks and their survival rates to various stages of their lives. These data help managers determine the impacts of hatchery reared fish on naturally produced fish.

The data generated by the ASA-8906500 is also essential in the current Congressionally mandated Artificial Production Review for the Columbia Basin, and in the hatchery audits performed under the IHOT criteria (7.2B.1 and 7.2B.2.).

Having a complete, long term database that includes all basin hatchery production and survival will provide the baseline data for comparative results of efforts to improve propagation at existing facilities called for in Sections 7.2D.1, 7.2D.3, and 7.2D.4.

Hatchery stock from 3 of the 4 facilities under the ASA-8906500 are reared for restoration programs of the Umatilla River (Section 7.4I) and the Yakima River (7.4K). Accurate evaluation of the donor stock is necessary to ensure the quality and appropriateness of the stock for continued use in these programs.

The ASA-8906500 meets the objectives in Section 7 by allowing fishery managers:

(1) to better account for proportions of weak and critical stocks in mixed stock fisheries from California to Alaska and especially in the mainstem Columbia, (2) to better determine the number of fish of each stock, including weak stocks, annually returning to various escapement areas, including dams, hatcheries, and

spawning grounds, (3) to determine which hatchery production results in reduced proportions of stray fish, and (4) to evaluate which type of hatchery production works best in terms of adult survival and fitness, and returns to the Columbia River.

Data from the ASA-8906500 provides the basic information to begin to answer the questions of straying and impacts to wild and naturally spawning stocks addressed in Sections 8.4C.1 and 8.4C.2 of the 1994 Fish and Wildlife Program.

Expansion of fish marking programs is specifically called for in Section 8.4D.1 to monitor weak stocks caught in fisheries. Fish are reared, tagged and marked, and evaluated at an ASA-8906500 facility (Eagle Creek NFH) for terminal fisheries, designed to help avoid the weak stocks of concern. The Snake River Recovery Plan (3.4.b) also advocates increasing terminal area fisheries. Coded-wire tag data from long term monitoring is used to evaluate the success of the fishery and the appropriateness of the donor stock for continued use in these programs.

The need for a hatchery monitoring and evaluation program is identified in several other Basin plans. The Snake River Recovery Plan (2.1.d.5) (NMFS 1995) and the Hydrosystem Operations Biological Opinion (VIII.A.13) both call for the establishment of a comprehensive monitoring, evaluation and research program. The July 31, 1996 fall chinook Biological Opinion "Impacts on Listed Snake River Salmon by Fisheries Conducted Pursuant to the 1996-1998 Management Agreement for Upper Columbia River Fall Chinook" relies on coded-wire tagged fish being present from this project as well as other projects (funded by BPA and other entities) to allow for successful monitoring of catch. The critical uncertainties that these Plans want addressed is an accounting of the proportion of wild and hatchery fish in both fishery catches and escapement (spawning grounds and hatchery racks). Without the ability to identify the origin of these fish and recover a significant portion of the tags, the ability to effectively manage recovery efforts and account for actions is non-existent.

The tag groups provided under this project can be used to model wild populations that are too sensitive to capture and tag. It also provides a useful tool to compare hatchery and wild populations that share environments located above or below Bonneville Dam, such as the Columbia River estuary, to better define limiting factors affecting fish survival.

Furthermore, the data generated by ASA-8906500 has provided the ability to prioritize hatchery production programs based on groups that perform well. This can improve cost effectiveness in hatchery operations.

The ASA-8906500 directly addresses many of the goals of the 1994 Fish and Wildlife Program by providing a tool that: (1) better accounts for proportions of weak or critical stocks from the Columbia River Basin that are taken in mixed stock fisheries from California to Alaska, and especially in the fisheries of the Columbia River system; (2) better accounts for the number of fish of each stock, wild or hatchery, that is recovered in various escapement areas (dams, hatcheries, spawning grounds) and allows more complete and accurate run reconstruction for stocks of interest; (3) allows monitoring and evaluation of hatchery production such that poorly performing production groups can be identified and changed or eliminated, and allows for identification of strays and the determination of total hatchery survival and distribution.

### **c. Relationships to other projects**

The 1994 Fish and Wildlife Program has a wide range of projects associated with its numerous measures, all of which address critical uncertainties associated with the particular area of concern. Some projects seek to improve habitat, others to improve existing artificial production, while others seek to assess the impacts on naturally produced salmon and steelhead of large releases of artificially produced salmon and steelhead, and still others seek to regulate catch in mixed-stock fisheries, and develop analytical methods to better predict and manage the basin's activities for the benefit of naturally and artificially produced salmon and steelhead.

Specifically, the ASA-8906500 has the following sponsors and supporters: PSMFC, The Fish Passage Center, Yakama Indian Nation, Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce

Tribe, WDFW, ODFW, NMFS, U. S. Army COE, and the Clatsop Economic Development Council (CEDC).

The Select Area Fisheries Project (9306000) provides for terminal area fisheries in the Columbia River with minimal by-catch of critical stocks and minimal straying into adjacent rivers. A portion of the coho salmon reared and tagged for this program come from a facility under the ASA-8906500 and located below Bonneville Dam, Eagle Creek NFH.

Eagle Creek NFH also provides coho for the Yakima River Coho Restoration Project (9603302). Eagle Creek stock is reared to fingerling size and transferred to Yakima River rearing and acclimation sites. Accurate monitoring and evaluation data on the donor stock is necessary to provide an accurate comparative analysis of the coho used in the restoration project and to evaluate the continued use of Eagle Creek stock in the program.

Spring chinook salmon at Carson and Little White Salmon NFHs are reared to smolt size and transferred to the Umatilla River hatchery facilities for those ongoing restoration projects, Umatilla Hatchery Satellite Facilities O&M (8343500) and Umatilla Hatchery Monitoring and Evaluation Projects (9000500). Evaluations of the survival and performance of the transferred stocks are compared against the survival and performance of the donor stocks, facilities under the ASA-8906500.

Wenatchee and Methow River Coho Restoration (9604000) use adult and/or juvenile coho from appropriate lower river hatcheries. Coho from Eagle Creek and Willard NFHs can be considered for this program (as, indeed, coho from these facilities are currently being used in other tribal coho restoration projects), but only if data continues to be available to evaluate the survival and performance of the donor stocks. The ASA-8906500 provides this data.

Simply put, the coded-wire tag is the tool of choice for assessing responses of fish to environmental variables over broad geographic areas. The data generated by coded-wire tag releases from hatchery populations and those involved in specific hypothesis testing are used by projects such as the PATH group (8600800). It is important to the PATH process that coded-wire tag data from all sources of fish be available to make the run reconstructions of species of interest as complete and accurate as possible. Accurate stock compositions are obtained when this coded-wire tag data is available.

Similarly, data can be used by any other researcher(s) to compare survival and distribution responses of stocks from above or below Bonneville Dam. The Comparative Survival Rate Study (8712702), the key component of the Mainstem Passage Experimental Program, is using one of the ASA-8906500 hatcheries, Carson NFH, as a control group for its study. The coded-wire tag data was, and remains, vital to make smolt-to-adult survival rate (SAR) comparisons and to prescribe the amount of PIT tags needed to achieve acceptable confidence and precision in the analyses. Final analysis will include a comparison of survival rates of coded-wire tags and PIT tag estimates.

The Nez Perce Tribe Coho Restoration Program, a project funded by the Nez Perce Tribe, is using coho supplied by Willard NFH in their restoration work in tributaries to the Clearwater River. Coded-wire tag data must continue to be available to evaluate the survival and performance of the donor stock against the performance of the fish used in the restoration program.

**d. Project history** (for ongoing projects)

In 1989 the USFWS received a BPA contract, “Annual Fish Marking-Missing Production Groups (8906500)”, to begin annual coded-wire tagging and marking production releases of anadromous salmonids at federal hatcheries which were not currently being marked. The goal was to estimate the survival rates

and distributions of each group and dovetail into basin-wide stock assessment. These hatcheries were the “missing groups” of fish needed to have complete data sets in the basin. Another BPA project, begun in 1983, “Operation and Maintenance of BPA Fish Marking Trailer (8300600)”, was merged into project 9806500 in 1995 by BPA. The work remained funded under 8906500, but the project 8300600 no longer existed. Under 8300600, the USFWS had received funding to tag and mark fish for several BPA projects, such as the Yakima Reprogramming study, Youngs Bay-Clatsop County Salmon Rearing Program, Fish Passage Center studies, and several other tribal, state, and federal programs. During that time period fish marking assistance and/or equipment was not readily available to many entities needing to mark fish.

Since 1989, over seven million anadromous fish have been tagged and marked strictly related to the ASA-8906500. Project reports include “Annual Coded Wire Program: Missing Production Groups” annual reports for 1989-1998.

Year	# Tagged for Annual Stock Assessment	Budget*
1989	334,236	\$157,796
1990	372,770	\$170,614
1991	882,816	\$271,410
1992	872,385	\$294,786
1993	1,094,511	\$406,790
1994	1,042,845	\$360,865
1995	1,076,237	\$502,700
1996	556,744	\$205,965
1997	718,358	\$362,913
1998	693,431	\$407,942
1999	395,000	\$399,460**
2000	250,000	\$110,586**

\* Budget column includes both 8906500 and 8300600 for 1989-1999. Project 8300600 was dropped in 1995 by BPA, but the same funded work was put under 8906500. Over the years various BPA funded work other than “Annual Stock Assessment” (formerly “Missing Groups”) was placed into the existing 8906500 contract for ease of administration. The FY 2000 budget is now just for “Annual Stock Assessment” tagging and evaluation and physical trailer maintenance. BPA project contract 8300600 has been re-established for FY 2000 to administer all other BPA funded projects this office sub-contracts with. That work will be properly accounted for in the appropriate project proposal submitted to BPA.

\*\* Proposed tagging and budget.

#### e. Proposal objectives

- Objective 1: Coded-wire tag, mark, and release at least one group of smolts from those federal anadromous hatcheries not currently doing so.
- Task a) Coordinate tagging with all appropriate entities.
  - Task b) Apply coded-wire tags to and remove the adipose fins from:
    - 75,000 spring chinook at Little White Salmon NFH
    - 75,000 spring chinook at Carson NFH
    - 50,000 coho at Willard NFH
    - 25,000 coho at Eagle Creek NFH
    - 25,000 coho at Eagle Creek NFH (CEDC)
  - Task c) Prepare annual budget and activity report.
- Objective 2: Recover and decode coded-wire tags from returning salmon at four federal hatcheries. Estimate survival and distribution of tagged groups.

- Task a) Examine 100% of returning salmon groups at the four hatcheries where groups were tagged and released. Collect scale sub-samples. Collect snouts from all fish with coded-wire tags.
- Task b) Recover and decode tags.
- Task c) Read scales.
- Task d) Prepare data for input to PSMFC database.
- Task e) Access PSMFC database for other recoveries of tagged groups. Estimate survival and distribution of tagged groups.
- Task f) Analyze and evaluate results.

Objective 3: Prepare annual written report which will evaluate the survival and distribution of all representative groups of production fish released at each of 11 federal anadromous hatcheries in the Columbia River Basin.

- Task a) Retrieve coded-wire tag recoveries from PSMFC database for tagged production groups.
- Task b) Estimate survival and distribution of tagged groups. Evaluate results.
- Task c) Prepare analysis annual report.

## **f. Methods**

Survival differences between chinook and coho determine the number of fish needed for tagging such that at least 30 recoveries from each group (DeLibro, F.E. 1986) are made in total or in each fishery or escapement location, and that sufficient power exists such that the probability of detecting a 50% difference in survival among groups is  $p = 1 - 0.95/2$ . These fish are randomly selected for tagging from the general hatchery population. At some hatcheries, more than one tag group is used for a species because the release timing or size of each group are different enough that survival may be different. Because each tag group may represent up to several million untagged fish, it is important to have as many tag groups at a particular hatchery as necessary to make an accurate estimate of total adult contribution. The critical assumptions for the project are 1) tagged fish represent untagged fish (behavior and survival are not affected by tagging), and 2) the probability of recovering tagged fish is not contingent on hatchery location.

After fish are selected from the general rearing population and brought to the tagging trailer, coded-wire tags are applied into the snouts of the fish and the adipose fin is removed (Ambrogetti 1976). These procedures are approved by the Bonneville Power Administration and conform to the most recent edition of the "A Manual of Procedures for Coded-Wire Tagging of Pacific Salmonids" (Pacific Fisheries Management Council 1987). Upon return as adults, most stocks of tagged chinook are identified by the missing adipose fin. Beginning in 1999, however, all returning hatchery origin coho have been mass marked by removing the adipose fin. Thus, identification of coded-wire tagged coho is done using a tag detector. Biological data is collected along with the snout of the fish. Once the snouts are collected, the coded-wire tags are removed from the snouts, the code identified, and the data for all the individual tags recovered are recorded into the USFWS regional fisheries database (CRiS) and then sent to the Pacific States Marine Fisheries Commission where the data are collated, expanded based on the sampling rate of the various collection sites, and then entered into the Regional Mark Information Center database. Once in the central database, anyone can access the data for any purpose.

The Annual Stock Assessment Report (formerly Annual Coded Wire Program Missing Production Groups Annual Report) is generated summarizing the data. The release information is collected from the CRiS database. The recovery information for all federal hatcheries in the basin is obtained from the PSMFC database after the data is finalized for the most recent year. The total estimated recoveries by each catch type and location as well as the sum of the total recoveries for each tag group is retrieved and the total survival (estimated recoveries/total tags released) and the contribution rate (total tags recovered by fishery or escapement/total tags recovered) is calculated at the 95% confidence level. When two or more tag groups are released from a site in a given year, the null hypothesis that survival was not significantly different at the 95% confidence level is tested.

A "Stock Assessment Reference Summary" is prepared for each hatchery, brood year, and species that had coded-wire tags. Because many fish were released without representative coded-wire tags before 1989, a single production expansion factor (PEF) is calculated for each hatchery, brood year, and species. This PEF is used to expand recovery information for unmarked fish released, and to determine a general picture of the overall contribution and survival rates for each facility.

Total survival and distribution graphs for each hatchery and species are prepared, and summaries of release and recovery information are included in the Annual Report.

#### **g. Facilities and equipment**

Equipment used to coded-wire tag and mark fish include two large, mobile fish marking trailers. Now considered a standard piece of equipment, these trailers were first developed and proven by USFWS fisheries biologists and technicians in the 1970's (Ambrogetti 1978). The trailers have built in holding tanks with a pass through water system to maintain proper fish health during the tagging procedure. Fish are tagged on site at the hatchery, and the same water the fish are reared in is pumped through the trailer's tank system. This minimizes stress to the fish. The trailers are each equipped with six coded-wire tagging machines and quality control devices manufactured by Northwest Marine Technology. This is the same standard, contemporary equipment used by Washington Department of Fish and Wildlife and Oregon Department of Fish and Wildlife in their fish marking programs. Equipment is repaired or replaced as needed. No new tagging equipment is projected to be purchased in FY 2000.

Suitable laboratory and office space, along with the necessary equipment for the recovery and decoding of coded-wire tags, and the preparation of reports is maintained by the USFWS Columbia River Fisheries Program Office in Vancouver, Washington.

#### **h. Budget**

The scope of work for FY 2000 has changed appreciably from FY 1999. Work directly related to several other BPA projects, such as rearing, tagging and marking of spring chinook for the Umatilla River restoration programs and the Fish Passage Center's smolt monitoring programs are no longer included in this project. Additionally, the coded-wire tagging and marking of 120,000 spring chinook at Entiat NFH will not be funded by BPA under the Annual Stock Assessment, project as in 1999. These fish will be tagged and marked through funding from the Bureau of Reclamation. Therefore, the budget request for all item categories has decreased. The amount of overhead (indirect costs) charged by USFWS increased 1.7% beginning in 1999 to 34.2%.

## **Section 9. Key personnel**

### **Project Coordinator: Walter J. Ambrogetti**

Title: Deputy Project Leader, Supervisory Fishery Management Biologist, Columbia River Fisheries Program Office

FTE/Hours on Project: 0.06 FTEs

Duties on Project: Contracting officer, budget development, and administration.

Education: B.S. Fish and Wildlife Management, Oregon State University, 1968

Experience: Mr. Ambrogetti joined the USFWS in 1970 and has worked in the field of fisheries and fish marking for over 25 years. Mr. Ambrogetti was responsible for the design and construction of fish marking trailers. Mr. Ambrogetti wrote the USFWS Special Report "Northwest Fisheries Program, Micro-Tagging Trailer", July 1976. This report was reprinted in 1978 (with permission from USFWS) by Northwest Marine Technology, the manufacturer of the coded-wire tags and tagging machines, for distribution to their customers. Literature on using coded-wire tagging machines in mobile trailer units was not available anywhere else at that time. Mr. Ambrogetti served as the assistant USFWS Coded-Wire Tag Coordinator to the Pacific Marine Fisheries Commission for several years.

**Project Supervisor/Analyst: Tim Roth**

Title: Fishery Management Biologist, Columbia River Fisheries Program Office

FTE/Hours on Project: 0.04 FTEs

Duties on Project: Project supervisor and program analyst.

Education: B.A. Biological Sciences, Northwest Nazarene College, 1974

Experience: Mr. Roth joined the USFWS in 1975 and has worked in the field of Columbia River and west coast ocean and harvest production management for the last 23 years and currently oversees the USFWS marking program for the Columbia River Basin. Mr. Roth has served as the USFWS representative on the Pacific Fishery Management Council's Salmon Technical Team, the Pacific Salmon Commission's Chinook Technical Committee, and continues to serve as the USFWS representative on the Technical Advisory Committee and Production Advisory Committee for the U.S. v. Oregon Columbia River Fish Management Plan. Mr. Roth has co-authored numerous reports pertaining to the harvest and production management, and impacts on listed stocks as a member of these technical committees. Mr. Roth has recently taken on the role of USFWS policy representative for the Pacific Fishery Management Council.

**Database Specialist/Annual Report Preparation: Stephen Pastor**

Title: Fishery Management Biologist, Columbia River Fisheries Program Office

FTE/Hours: 0.14 FTEs

Duties on Project: Maintain data set, analyze data, produce annual analysis report.

Education: B.S. Biology, Pennsylvania State University, 1972

Experience: Mr. Pastor joined the USFWS in 1974 and has worked in the field of hatcheries, hatchery database management and use, and fish marking for the past 12 years. Mr. Pastor manages the USFWS regional fisheries database (CRiS). This includes maintenance of the database for coded-wire tag releases and recovery information at all federal hatcheries in the basin, production of data reports, and distribution of tagging and coded-wire tag data to PSMFC. Mr. Pastor is USFWS representative to the 'StreamNet' steering committee.

**Papers and Presentations:**

- "'Missing Production Groups' at National Fish Hatcheries in the Columbia basin", Columbia River Basin Fish and Wildlife Program Review of Projects, Portland, Oregon, March 1997
- "Columbia River (information) System (CRiS) - Status, and Following the Paperless Trail", Northwest Fish Culture Conference - Fife, Washington, December 1995.
- "A Database Pond Inventory System - Leaving a Paperless Trail", Northwest Fish Culture Conference - Boise, Idaho, December 1990.
- "Overview of Harvest and Hatchery Survival. What's Going On? How are your fish doing?", 1st Annual Fish Culturist Workshop in Pendleton, Oregon June 1995.
- "Better Information for Hatchery Managers - a Database Method for Transferring Information to the Hatchery, and from the Hatchery", Northwest Fish Culture Conference - Gleneden Beach, Oregon December 1989.

**Annual Report Preparation: Steven K. Olhausen**

Title: Fishery Management Biologist, Columbia River Fisheries Program Office

FTE/Hours on Project: 0.08 FTEs

Duties on Project: Annual report preparation.

Education: B.S. Fish and Wildlife Management, Oregon State University, 1973

Experience: Mr. Olhausen joined the USFWS in 1973 and has worked in the field of fisheries and fish marking for over 20 years.

**Field Programs Supervisor: Ken Walch**

Title: Fishery Management Biologist, Columbia River Fisheries Program Office

FTE/Hours: 0.09

Duties on Project: Supervises all field tagging and recovery operations, reading of scales for age structure analysis, and initial computer data entry.

Education: B.S. Wildlife Management, University of Montana, 1964

Experience: Mr. Walch joined the USFWS in 1983 and has worked in the field of fish marking for 15 years.

Other USFWS personnel involved with this project include:

Carolyn Minor and Deborah Burkett – administrative support (0.04 FTEs)

Dan Magnuson, Chuck Fuller, and Pat Kemper – tagging supervisors and tag recovery (0.19 FTEs)

**Section 10. Information/technology transfer**

Release and recovery information for all coded-wire tag groups from federal hatcheries are annually reported to PSMFC for inclusion into their regional coded-wire tag database. These data are accessible by virtually anyone and are used for a variety of purposes. Data generated from this project can be used by other projects funded by BPA to help meet 1994 Fish and Wildlife Program goals. For example, coho tagged as part of the restoration programs in the Umatilla (9000500, 8343500), Wenatchee, Methow (9604000), or Yakima (9603302) rivers can be compared to survival of coho tagged in lower river hatcheries, to assess if mortality due to freshwater or ocean productivity is equal. Other uses include determining hatchery effectiveness, stray rates into watersheds with critical or listed stocks, and comparison of survival trends of Columbia River salmon with salmon from other geographic areas. These kinds of relational comparisons can provide insight into the relative productivity of the Columbia River system.

Tagging, recovery, survival, and distribution data is summarized annually and reported in Annual Reports that are published by BPA and available upon request. Results are used by USFWS hatchery evaluation teams for each federal hatchery. Data are often presented at professional meetings or workshops such as the Northwest Fish Culture Workshop, and those sponsored by the American Fisheries Society, or the Bonneville Power Administration.

**Congratulations!**